

REMARKS/ARGUMENTS

Claims 1-7 are pending. By this Amendment, claim 1 is amended. Support for the amendments to claim 1 can be found, for example, in the present specification at page 21 (Table 2), and in previously presented claim 1. No new matter is added. In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

Rejection Under 35 U.S.C. §103

The Office Action rejects claims 1-7 under 35 U.S.C. §103(a) over U.S. Patent No. 6,338,763 to Hashimura et al. ("Hashimura") in view of "Fracture Toughness Properties – Effects of Microstructure and Heat Treatment," from *Metals Handbook Desk Edition* ("Metals Handbook"). Applicants respectfully traverse the rejection.

Claim 1 recites "[a] steel wire for a high-strength spring having superior workability, the steel wire comprising tempered martensite, and comprising by mass: C: 0.53 to 0.68%; Si: 1.2 to 2.5%; Mn: 0.2 to 1.5%; Cr: 1.4 to 2.5%; Al: 0.05% or less, excluding 0%; at least one member selected from the group consisting of Ni: 0.4% or less, excluding 0%; V: 0.4% or less, excluding 0%; Mo: 0.05 to 0.5%; and Nb: 0.05 to 0.5%; and a remainder consisting essentially of Fe and inevitable impurities; wherein: the steel wire has a prior austenite grain size number of from 11.0 to 14.0; and a ratio ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) in the steel wire is from 0.67 to 0.85" (emphasis added). Hashimura and Metals Handbook do not disclose or suggest such a wire.

Applicants previously argued that one of ordinary skill in the art would not have been led by the teachings of Hashimura and/or Metals Handbook to modify the compositions of the steel wires of Hashimura as would be required to obtain the steel wire of claim 1.

Applicants respectfully submit that those arguments remain applicable to the outstanding rejection and, thus, those arguments are incorporated herein by reference.

Applicants have also previously argued that the results in the present specification and the Declaration Under 37 C.F.R. §1.132 submitted December 22, 2009 ("Declaration") demonstrate the non-obviousness of the steel wire of claim 1. In response, the Office Action asserts that the experimental results that are of record in this application do not demonstrate non-obviousness over the entire scope of claim 1. *See* Office Action, pages 9 to 10. While Applicants respectfully disagree and reserve the right to pursue broader subject matter at a later time, in the interest of advancing prosecution of this application, by this Amendment, claim 1 is amended to provide a range of prior austenite grain size numbers and a range of ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) that clearly corresponds in scope to the results shown in the present specification.

Applicants direct attention, in particular, to the results shown in TABLE 2 of the present specification. *See* present specification, page 21. As shown in TABLE 2, Examples No. 1-5, 7-9, 11-13 and 20 have prior austenite grain size numbers and ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) within the scope within the ranges recited in claim 1. These Examples include prior austenite grain size numbers and ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) that are exemplary of the full scope of the ranges recited in claim 1. Examples 6, 10 and 14-19 have prior austenite grain size numbers and/or ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) that are outside the scope of claim 1.

It is evident from the Examples described above that steel wires having compositions, prior austenite grain size numbers, and ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) within the scope of claim 1 provide substantially superior performance in coiling and/or fatigue life in comparison to steel wires that differ with respect to one or more

of the foregoing parameters. Moreover, these results are indicative of the full scope of claim

1. The Office Action has provided no basis for concluding that the results in Examples 1-5, 7-9, 11-13 and 20 are not commensurate in scope with the claims. Reconsideration of this point is respectfully requested.

The experimental results in the Declaration were not submitted solely to demonstrate unexpected performance (although it is plain that the Examples in the present specification according to claim 1 exhibit far superior fatigue life in comparison to the comparative examples in the Declaration). Such results also provided to rebut an assertion in the September 21, 2009 Office Action that it would have been obvious to reduce the prior austenite grain size in the metals in Hashimura. See September 21, 2009 Office Action, pages 5 to 6. The results in the Declaration demonstrate that one of ordinary skill in the art would not reasonably expect success upon modifying a steel wire to have a smaller prior austenite grain size. In particular, the results in the Declaration demonstrate that a steel composition according to Hashimura modified to have a prior austenite grain size as recited in claim 1 yields steel having far inferior fatigue life in comparison to steel compositions as recited in claim 1. See Declaration, paragraphs (4)(I) and (4)(II); present specification, page 21, Table 2. That is, the evidence in the Declaration indicates that the apparent disclosure in Metals Handbook that smaller prior austenite grain size is desirable would not alone have been sufficient to provide a skilled artisan with a reasonable expectation that merely modifying prior austenite grain size would result in a quality steel wire. Applicants respectfully request that due weight be given to this evidence.

Accordingly, Applicants have amended the claim 1 to specify particular, closed ranges of prior austenite grain size numbers and ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B), and the evidence of non-obviousness that is of record in this application is commensurate in scope with amended claim 1.

As explained, claim 1 would not have been rendered obvious by Hashimura. Claims 2-6 depend from claim 1 and, thus, also would not have been rendered obvious by Hashimura. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Double Patenting

The Office Action rejects claims 1-7 under the judicially created doctrine of obviousness-type double patenting over claims 1-14 of U.S. Patent No. 7,615,186 in view of Metals Handbook.

Claims 1-14 of the 186 patent do not recite or suggest the range of prior austenite grain size numbers or the range of ratios ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) recited in claim 1 of the present application. Moreover, for at least the reasons discussed above with respect to the rejection over Hashimura and Metals Handbook, one of ordinary skill in the art would not have modified the steels of the claims of the 186 patent as would be required to obtain steels satisfying the ranges of claim 1.

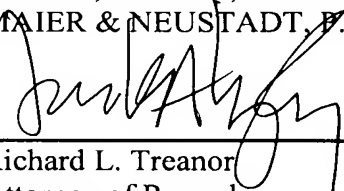
Accordingly, claim 1 of the present application is not obvious over claims 1-14 of the 186 patent in view of Metals Handbook. Claims 2-7 depend from claim 1 and, thus, also are not obvious over claims 1-14 of the 186 patent in view of Metals Handbook. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

For the foregoing reasons, Applicants submit that claims 1-7 are in condition for allowance. Prompt reconsideration and allowance are respectfully requested.

Respectfully submitted,

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